

# THE METHOD OF CALCULATING TIME IN THE UNITED STATES

Some Interesting Facts About Why it Exists and Some of Its Vagaries and Defects—Sent Out From Observatory at Washington.

Scientific American.

Our present method of calculating and indicating time is a legacy from the ancient Romans. Having become accustomed to it through long years of use we fail to notice its shortcomings, inconsistencies and absurdities. It is only when our attention is particularly directed to some glaring inconsistency or some unbearable hardship that we wake up to the situation and take measures to relieve ourselves of some burden that it imposes upon us.

Such an condition forced itself upon the attention of the public in 1883. Previous to that year each city and town reckoned its time from its meridian. This is to say, from the meridian passing through that particular place. It was impracticable for railways to arrange their time tables to conform strictly with this condition. Some attempts made to do so created considerable confusion. It necessitated the engineer and other train hands setting their watches at nearly every important station. This proved a very costly practice to the railroad companies and was the direct cause of some disasters. There were upward of 50 different kinds of railway time in the United States, and it was a usual thing for jewelry stores to provide their regulators with two minute hands, one for local time and one for railway time. This caused so much inconvenience to the public and became such a source of trouble to railway managers that, in order to relieve the situation, an agreement was entered into to adopt four meridians from which time for the United States should be taken.

The meridians adopted for this purpose were the seventy-fifth, from which Eastern time is taken; the ninetieth, for Central time; the one hundred and twentieth, for Pacific time. These meridians of 15 degrees apart, making a difference in time of exactly one hour between each. All the railways throughout the United States now arrange their time tables approximately in conformity with these meridians.

On November 18, 1883, this new system went into effect and there was a general resetting of clocks and watches all over the country. Every city and town now uses for its local time one of these meridians, the one used being identical with that used by the railways passing through or terminating at that place.

To fully comprehend the use of these meridians it must be borne in mind that longitude is universally reckoned from Greenwich. Every sea captain all over the world, regardless of from what port he sails or to what port he is bound, sets his chronometer by Greenwich time. It must also be borne in mind that the time occupied by the earth in making a revolution is 24 hours. Dividing 360 degrees by 24 hours gives 15 degrees; consequently 15 degrees has a time value of one hour. This is to say, the apparent motion of the sun from east to west is at the rate of 15 degrees per hour.

The meridians, it will be understood, run north and south. The sixtieth, from which Atlantic time is taken, passes through the eastern parts of the province of Quebec and New Brunswick, Canada. This meridian is used on some of the Canadian railways, but is not used in the United States. The seventy-fifth meridian, from which Eastern time is reckoned, passes through Herkimer, New York, western New Jersey and Eastern Pennsylvania, about midway between Trenton and Philadelphia. The ninetieth meridian, from which Central time is reckoned, passes through the extreme eastern edge of Minnesota, the western part of Michigan, the center of Wisconsin; through Illinois, 17 miles west of its capital—Springfield—and 12 miles east of St. Louis, through the extreme eastern parts of Missouri and Arkansas, the western part of Tennessee, three miles east of Memphis, through Mississippi, two miles west of Jackson, and through the eastern side of Louisiana, five miles east of New Orleans. The one hundred and fiftieth meridian, from which mountain time is reckoned, passes through Eastern Montana, 40 miles east of Miles City; through Eastern Wyoming, 10 miles west of Cheyenne; through Denver, and 10 miles west of Colorado Springs; through New Mexico, 50 miles east of Santa Fe; and through the extreme west of Texas, 85 miles east of El Paso. The one hundred and twentieth meridian, from which Pacific time is reckoned, passes centrally through the State of Washington and Oregon, forms the dividing line between Nevada and California, to a point 12 miles west of Carson City, thence through the center of California.

The ninetieth meridian furnishes time for a larger area than any other. As a matter of fact it supplies time to 55 per cent of the population of the United States. It requires three meridians to supply the remaining 45 per cent. There are, however, confusing irregularities caused by the locations selected by the railway companies for

changing their time schedules. This is unavoidable. Railways cannot be expected to change time exactly midway between meridians. They usually select the termination of divisions for that purpose. As a result the eastern and western boundaries of the area using central time from zigzag lines. This condition is productive of strange situations. Traveling from Greensburg, Kansas, to Beverly, Nebraska—a distance of about 200 miles due north—it becomes necessary for the traveler, if he would have his watch agree with the time used in the different towns through which he passes, to set it four times during his journey. This is owing to his crossing the zigzag boundary lines as laid out by the railroads.

Whenever a change of time is made by a railway there must of necessity be two kinds of time at that place. At Pittsburg there are eastern and central. Trains going east use the former, and those going west the latter. Buffalo has the same condition in an exaggerated form, for the reason that all trains going east use eastern time, while trains going west use both eastern and central. The Grand Trunk, the Michigan Central and the Wabash use eastern time, while all roads south of Lake Erie use central. Trains arrive and depart from El Paso, Texas, on four different kinds of railway time: Central, mountain, Pacific and Mexican. It is impossible to estimate the loss to the traveling public from mistakes caused by this confusing state of affairs, but in stating that the monetary loss to the public from time spent in efforts to decipher and unravel the complications in our railway time-tables brought about by our present confusing system is \$5,000,000 would not seem to be very far from being correct. That this is not an exaggerated estimate may be seen when we consider that American railways carry 2,500,000 passengers daily. If the average loss of time in deciphering and studying time tables is one half cent per passenger the yearly aggregate would amount to \$4,562,500. In addition to this our complicated system involves increased labor and expense to the railway companies in making out their time-tables. Here, then, we have \$5,000,000 a year absolutely wasted. Enough to build a battle ship and this does not take into account the amount lost by mistakes arising from the same cause.

Another fruitful source of confusion and mistakes is the method of dividing the day and night into two periods of 12 hours, numbered 1 to 12, necessitating the use of those awkward and inconvenient affixes a. m. and p. m.

The Egyptians were the first to divide the day and night into 24 equal parts. They numbered the hours 1 to 24. The Romans began their day at sunrise, numbering the hours to sunset 1 to 12, and numbering them from sunset to sunrise, also 1 to 12. Our a. m. and p. m. is a part of the burdensome legacy inherited from them. The hours constituting their day and night were of unequal and constantly varying lengths. In course of time they made a change to our present system, and had they adopted the Egyptian method they would have conferred an inestimable benefit upon mankind.

The remedy for the evils we have described lies: First in numbering the hours as the Egyptians did. Beginning, as we do now at midnight we would number the hours up to noon to 12; the hour we now designate as 1 p. m. would be 13, and so on to 24. Second, we should adopt one meridian for the entire United States, which could be done without any serious disturbance of affairs. The change which was made in 1883 was hardly noticed and proved a great benefit without working hardship on any one. The advantage secured by that change was insignificant as compared to the advantage to be secured by the use of one meridian and the 24-hour system.

Canada has already adopted the 24-hour system on her railroads west of Port Arthur, and China has adopted one meridian for the entire empire, which embraces 60 degrees, the same amount as the United States. Shall we allow ourselves to be left behind by other nations?

Let us suppose that the 90th degree—central meridian—should be adopted as the one from which the United States time should be reckoned; what then would be the effect on business? The hour of 8 a. m. is now pretty generally adopted for the commencement of business. If we should take our time from the central meridian it would be 9 in New York, 8 in Chicago, 7 in Denver and 6 in San Francisco; but what matters it where the hands of the clock point so long as business commences the same amount of time after sunrise? Clocks and watches should be our servants, not we theirs.

On April 15 the sun rises at Philadelphia at 5 o'clock as we now reckon time. This is to say, the Philadelphians commence business three hours after sunrise. The only difference that the change would produce

is that the hands of their clock would point at 9 instead of 8.

We would soon become accustomed to the proposed change and the great benefit and saving resulting therefrom would repay us many times over for any slight inconvenience that might at first be felt. With this system in force there would be no setting and resetting of traveler's or railroad employee watches. One might travel from coast to coast without disturbing his watch. The reading of railway time tables would be so simplified that there would be no excuse for making mistakes. The absurdities that now exist in the matter of time would be eliminated.

By our present system of reckoning time it would have been possible for an event to have occurred in New York on January 1, 1911, at 1 a. m., and for that event to have been known in San Francisco at 10 p. m. December 31, 1910. It is now possible to leave El Paso for the West one hour and fifty minutes before you arrive from the East—according to railway time tables. The writer recently saw the apparent anomaly of two trains standing side by side in the station at Buffalo, both headed for the West, yet the engineers' and conductors' watches on one train were just one hour ahead of the other. This sort of incongruity would be impossible with the proposed new system.

Half a century ago there was not a watch in existence capable of meeting the requirements of American railway time service today. Railway time inspection has set the limit of variation from true time, for its employees' watches, at 30 seconds a week. This means that the balance wheel shall not vary in its motion to the extent of one vibration out of every 20,000. Taking into consideration the various causes of disturbance to which a railway engineer's watch is subjected, the jolts and jars, the changes of temperature and the magnetic influence incidental to the proximity of large masses of iron and steel, this performance is truly remarkable. That it is possible to secure such accuracy in such a tiny piece of mechanism subjected to those adverse influences is little short of marvelous, and justifies the claim that the watch of today is the most wonderful piece of mechanism that the ingenuity of man has ever produced.

The requirement for accuracy in railway watches in particular, and for others as well, is becoming more exacting every day. Horologists are at their wits' end to meet them. The time is surely coming when a purely mechanical device will no longer suffice to produce sufficient accuracy. What then? Some other force of nature must be enlisted. What will it be? What else but that mysterious force, electricity? That wonderful power, which is being harnessed to lighten man's burdens and minister to his wants and pleasures. Yes; wireless electricity is destined to solve the problem.

The time is now sent out from the Observatory at Washington from an astronomical clock, so protected against all disturbing influences that it runs with infinitesimal variation, and is corrected by nightly stellar observations. Centrally located clocks controlled from this master clock at Washington will be used to send out aerial electric waves. These clocks will control a radius of, perhaps, 100 miles. The watch and the clock of the future, like their precursors, the sun-dial and the clepsydra, will be relegated to the shelves of our museums, their places taken by electric receivers contrived to indicate time received from these central clocks.

The wild high-bush cranberry, common in many marshy districts, is good both as an ornament on the lawn and for making jelly.

## Community Co-operation as Advocated by Poe, Backed by Derby and Applied by Ross.

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bring good prices in any market we may choose to ship to. Now we go up to the mountains to find the stock gathered for us. Those mountain fellows have already advanced to where they understand the value of uniformity in their herds. They can pick up a car of eleven hundred pound Shorthorns or Herefords, or whatever they have, and do it in short order, for the farmers are breeding for uniformity. I have already put a few southern heifers over in the pasture lot, but what we expect to do chiefly is to breed our present stock of cows, as that permits the farmer to go ahead with what he has and with the pure Shorthorn bull have a good half-blood in the first crop of calves. The steers from that crop can be made into excellent beef, and the heifers raised to be much better cows than they stock now on the farms. The second generation will be three-quarter blood, and three-quarter blood Shorthorn steers will make fine beef cattle if properly handled.

It is only by a visit to a place where the people are undertaking co-operation by the community that the magnitude of the movement sweeping the State can be comprehended. Poe in his book cites a number of successful examples, and he is going to be a factor, as he has been in the past, in stirring up a lot more interest in

the problems such as the Drowning Creek folks are working out. It is easy to recall that over the State several centers of enthusiastic co-operation are at work. Most of them are getting results, some pronounced, some not so much so, yet all are trending in the right direction, and all are having an influence for better things. Yet not many sections seem to be figuring on putting so much of the general operation of the whole community on a co-operative base as these Drowning Creek folks are planning. Here the scheme involves all the people, and would like to make everything as co-operative as could be done.

The allusion of Derby to Ross gets us back to Mr. Ross again, and that is merely another illustration of co-operation. Ross is a graduate of an agricultural college. He comes out to Derby's big plantation as manager of a big business proposition. He is of an affable disposition and he makes friends of his neighbors on the smaller farms. They drop in to chat with him as they drive back and forth, and he has occasion to drive over to their farms, for like everybody else out on the good roads he runs a car.

Ross does things on the Derby place and gets results. Immediately his example has become the suggestion for the neighbors, and while Ross is running the big farm he is influencing all the farms around him. Derby is another man who makes acquaintances. He is a good mixer, and instead of standing aloof from his neighbors he is one of the community. The work done at A. and M. College is strictly a co-operative work for the State. The young men who go out from that institution presumably go to work for themselves or for the man or concern they hire to put every idea they carry away with them and put into practice in any place becomes at once the property of the community that is working forward.

It is possible these things are only forerunners of what is about to come on the farms. In everything else co-operation has already arrived. Capital hardly thinks of trying to operate on a big scale singly. The corporation is nothing but a form of co-operation along lines laid down by law, and restricted to certain narrow fields. But it is a form that does not move backward. The same tactics applied on a more flexible plan to the community is as little likely to retrograde.

Good roads all over this part of the State are a revelation. It is easy to dodge about over the three counties, and the roads are such that they invite the run. Several things tend to surprise the visitor, one of them being the decided change that has taken place in the character of the cattle since the ticks have been wiped out. It looks like a new country to see the sleek grazing stock in the fields, and it ensures a new country when this sight has spread over more farms. Whether it is due to the spirit of co-operation and community stimulation or, what, it is pretty evident, that a newer spirit of farm progress is at work along all these improved roads, the style of farming seems to have grown more decisive and more intensive. No doubt the good road, the good school house, the blooded stock and all these things tend to make everything else look up for improvement is the ultimate aim of all of these innovations.

One thing that can not escape the eye of the stranger on the fine new roads that lead down the Drowning Creek Valley is that much land of fine quality is here yet awaiting the settler and developer. There is so much of such evident excellence that it takes no dreamer to see that in the future if these improvement schemes keep up the triangle that centers in the corner of Richmond, Montgomery and Moore counties is destined to be one of the most desirable and thrifty parts of the South. Drowning Creek is not far from that undefined line which separates the Sand Hills from the Piedmont, and because the dividing belt shares the character of the two sections it is right valuable for diversified farming. It enjoys the advantages of both sections in fertility of soil and ease of working, in the abundance of springs of soft water, in early spring, extensive sweep of bottom land, clay and rock foundation for much of the land, and a good community. Railroads are accessible in every direction, and the good roads that have made Moore county famous go down the Richmond county side of the creek as well as down the Moore county side.

The fact is that county lines do not long serve as a barrier between communities in their improvements. That is shown in the fact that the new community school at the Derby plantation includes portions of the three counties in its field. It is shown in the fact that the school district is on the good road that leads to Pinehurst, which is the Capital Highway, and it is on the good road that leads to Hamlet and Keyser by another route. It is in the territory of the western extension of the Capital Highway, and children may come to school on three or four good roads from varying directions. These things are infectious once community work is started. The Drowning Creek community will see other community organizations following in the neighborhood and before long all over the State because it is a good thing for the rural neighborhood.